

DECUS NO.

8-644

TITLE

MINMON - TD8E DECTAPE MINIMONITOR

AUTHOR

lan H. Witten

COMPANY

Department of Electrical Engineering Science University of Essex, United Kingdom

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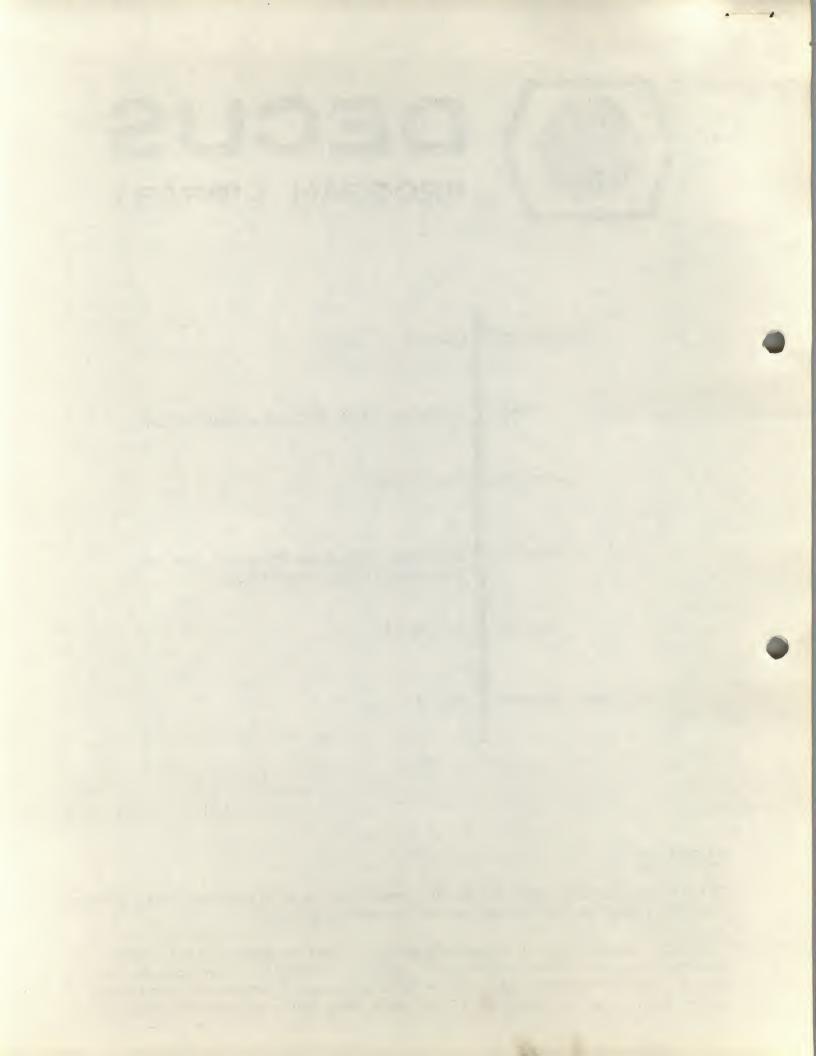
SOURCELANGUAGE

PAL III

## ATTENTION

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DECUS Program Library Write-up

**DECUS NO. 8-644** 

#### SECTION A

### Setting up the System

### 0. Introduction

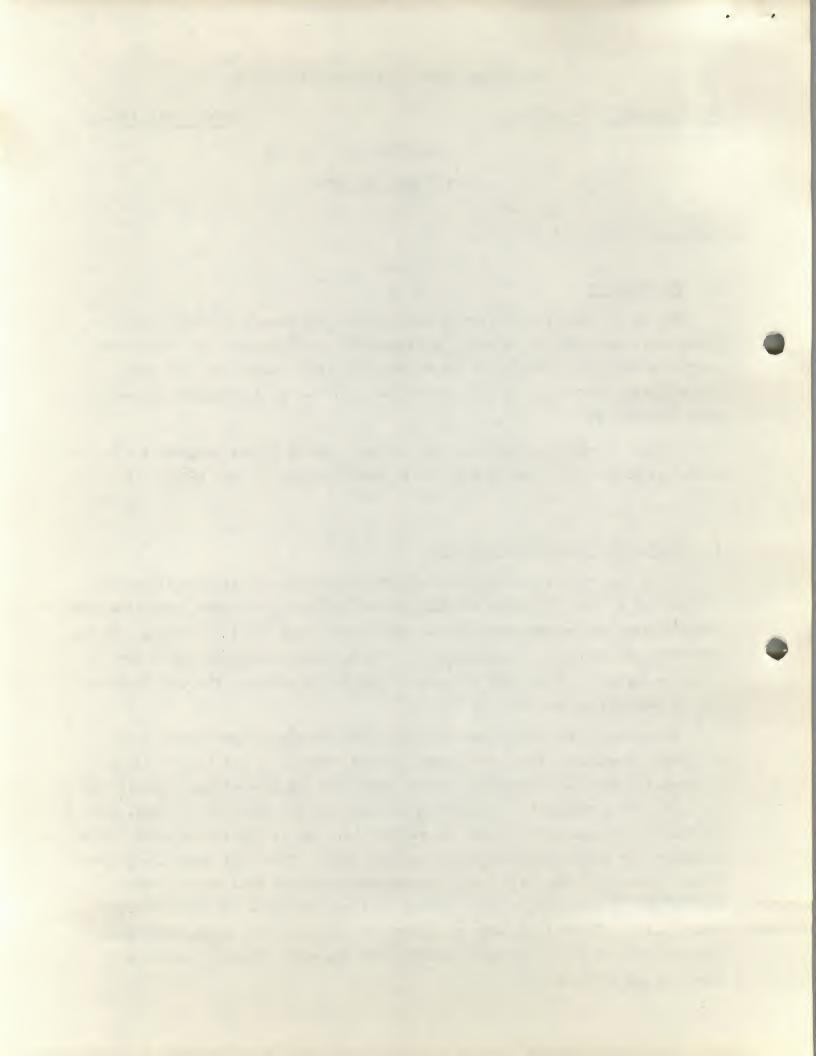
Use of the TD8E Minimonitor is described in the companion 'Users Manual'. These notes describe how to bootstrap the system onto DECtape, how to use some auxiliary functions provided on the minimonitor system tape, how core images are organised on DECtape by the minimonitor, and how the minimonitor system is organised in core.

You are strongly advised to read the Users Manual before proceeding with the write-up, to get some idea of what the minimonitor can do. (See SECTION B)

### 1. Getting the system onto DECtape

It is important to distinguish between binary tapes containing the entire minimonitor system, including the DECtape read and write routines, a routine for bootstrapping the system onto DECtape, etc., and binary tapes containing just the core-resident part of the minimonitor. DECUS supplies a paper tape of the complete system. (This tape includes a routine for punching the core-resident part alone: see Section 2.)

To bootstrap the system onto DECtape, load the minimonitor system tape using the normal BIN loader procedure. (It is imperative that the BIN loader is used, because the minimonitor system writes the top page of core onto DECtape and uses this subsequently for loading programs from the teletype.) Next, mount a formatted DECtape on TD8E Drive O, put the switches to REMOTE and WRITE ENABLE, and start the minimonitor system at location 7000. This will cause the program to move the BIN loader to another part of core, move the minimonitor command decoder and read routine to the top page of core, and write the first 37 core pages onto the first few blocks of DECtape (minimonitor core image O). The program exits to the minimonitor command decoder, which responds with a # . (See the Users Manual.)



# 2. Punching tapes of the core-resident part of the minimonitor

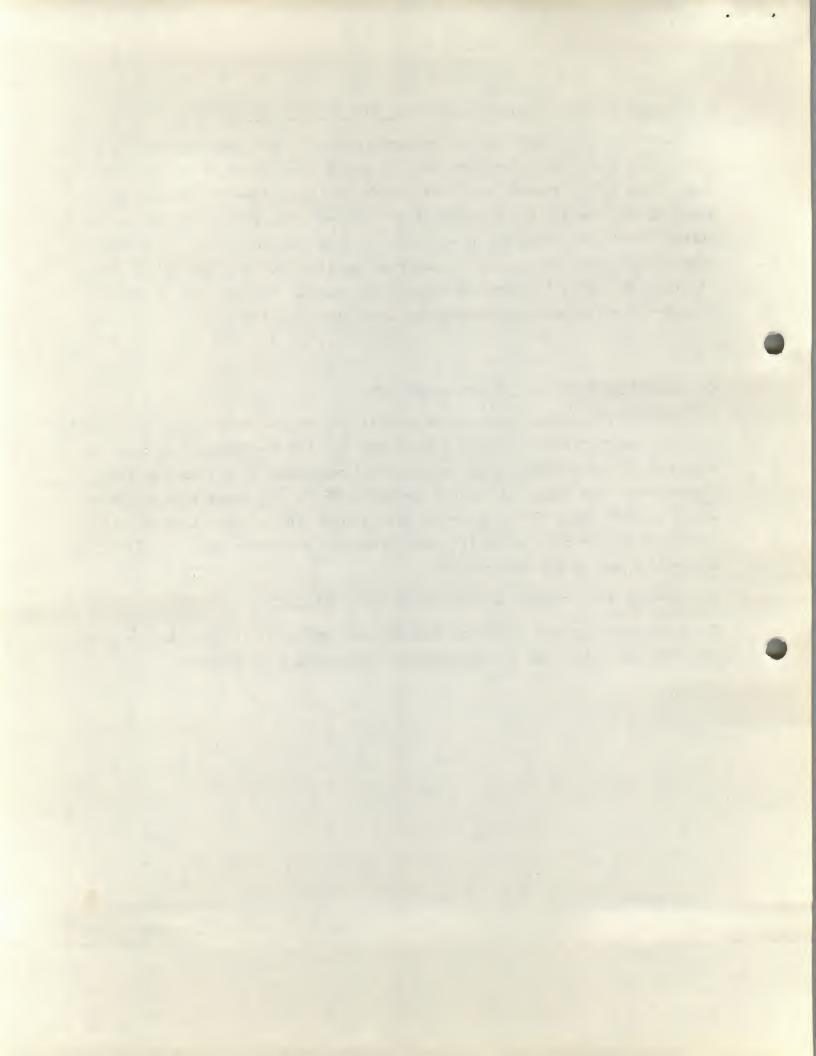
Users of the minimonitor system normally need a BIN paper tape of the core-resident part only, and not the full system tape issued to you by DECUS. Such a tape can be punched after the system has been written to DECtape by stopping the computer and starting it at location 1000, with the SR set to 0. Further tapes can be punched at any time by using the minimonitor to read back core image 0, and starting the computer at location 1000 with the SR set to 0. If the SR is set to 1 before the computer is started, a paper tape is punched in a format suitable for the Bootstrap Loader (DECUS 5/8-27).

## 3. Organisation of core images on DECtape

Becuase the minimonitor is such a small program, it necessarily uses DECtape in a very naive manner. 37-page core images (all but the top page of core) are stored on 40-block chunks of DECtape, so that core image 0 is stored on tape blocks 0-36, core image 1 is stored on blocks 40-76, core image 2 on blocks 100-136, ..., core image ']' is stored on blocks 2640-2676. Block identification characters are in order of ASCII codes, from code 260 (0) to code 335 (]). Thus the legal block identifications are:

0123456789:; < = >?@ABCDEFGHUJKLMNOPQRSTUVWXYZ[\]

The minimonitor ignores checksums from DECtape, and so it is essential to ensure that the tape drives are working properly before using the program.



#### SECTION B

#### USERS MANUAL

#### 0. Introduction

The TD8E Minimonitor enables 4K core images to be stored on DEC tape and loaded when required. The monitor comprises:

- a) A command decoder and DECtape read routine, normally occupying core locations 7600-7777;
- a-modified version of the BIN loader, a 200 word routine capable
   of being executed in any core page;
- c) a DECtape write routine, a 200 word routine capable of being executed in any core page.

The TD8E minimonitor is incompatible with the OS8 DECtape file structure.

### 1. Identification of Core Images

The minimonitor deals with core images comprising the first 37 pages of core (all but locations 7600-7777). It is oblivious to the core bank structure of PDP8s with more than 4K.

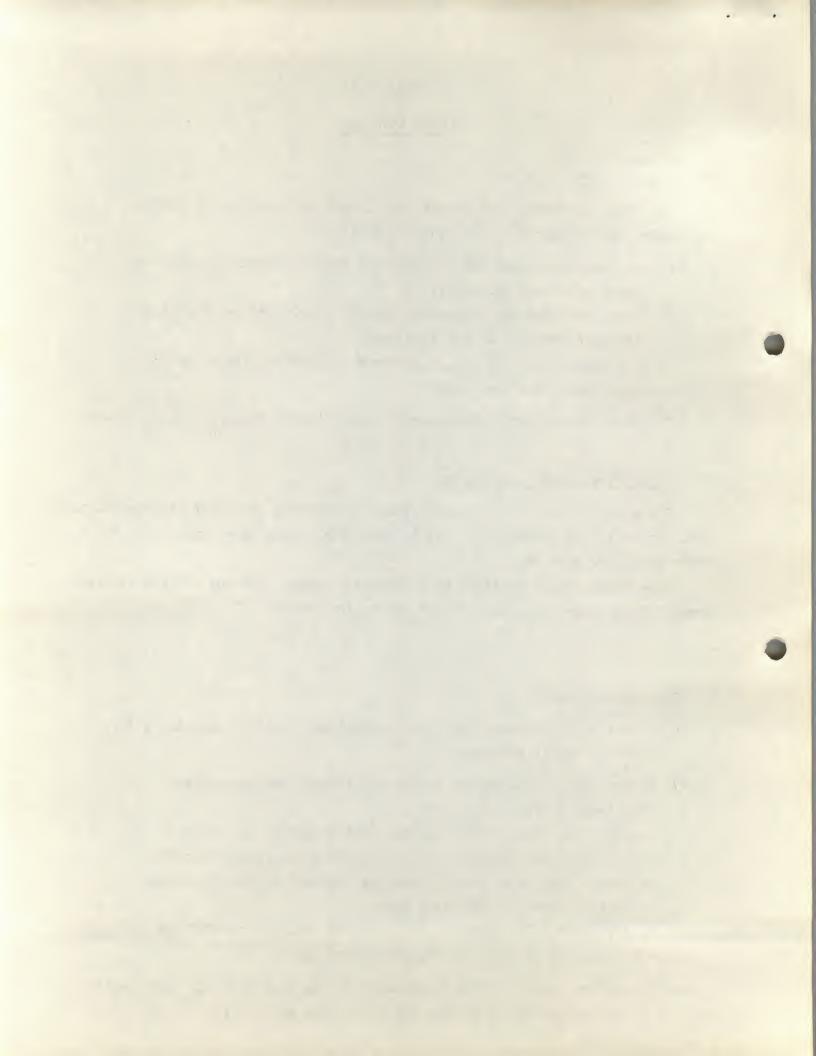
Core images are identified by 1-character names: 0-9 and A-Z are normally used. Core image 0 is reserved for use by the system.

### 2. The Command Decoder

This has starting address 7600, and identifies itself by printing a ...
There are three commands:

- a) R, for read. Followed by a core image name: the appropriate core image is read into core.
- b) L, for load. The switch register must be set to the first address of a page in core, and the computer halts with AC=7777 to enable this to be done. Pressing CONTINUE causes the loader to be read into the indicated page.
- c) W, for write. The computer halts as for (b), and the DECtape write routine is read into the indicated page.

Any character which is typed in response to the monitor's # will be taken as L, R, or W; according to whether its ASCII code is < , =, or > 322.



#### 3. The BIN Loader

Once the loader is in core, it halts to enable bit 0 of the SR to be set for low or high speed reader. Loading commences when CONTINUE is pressed. After the tape is loaded, the checksum is examined. If it is zero, the monitor is entered immediately, and it responds with a # . The machine halts with the checksum in the AC if it is nonzero.

#### 4. The DECtape Write Routine

When the write routine is in core, it expects a core image name to be typed. It then proceeds to write the current core image onto tape, under that name. Writing on core image 0 is prohibited.

## 5. Loading the Minimonitor, and Restoring the BIN Loader

The minimonitor is loaded using the BIN loader, as normal. It must be executed, starting at 7600, immediately it is loaded - without loading other tapes first.

To get back to the BIN loader, core image 0 should be read, and the computer started at location 7777 as usual.

### 6. Examples of Use

Suppose it is wished to load the Editor into core, store it in core image 6, and return to the BIN loader.

Load minimonitor using the BIN loader

Start it at location 7600

Minimonitor types "#"

Type L (for load)

Computer stops with AC=7777

Set SR to 7000 (Editor does not use locations 7000-7177)

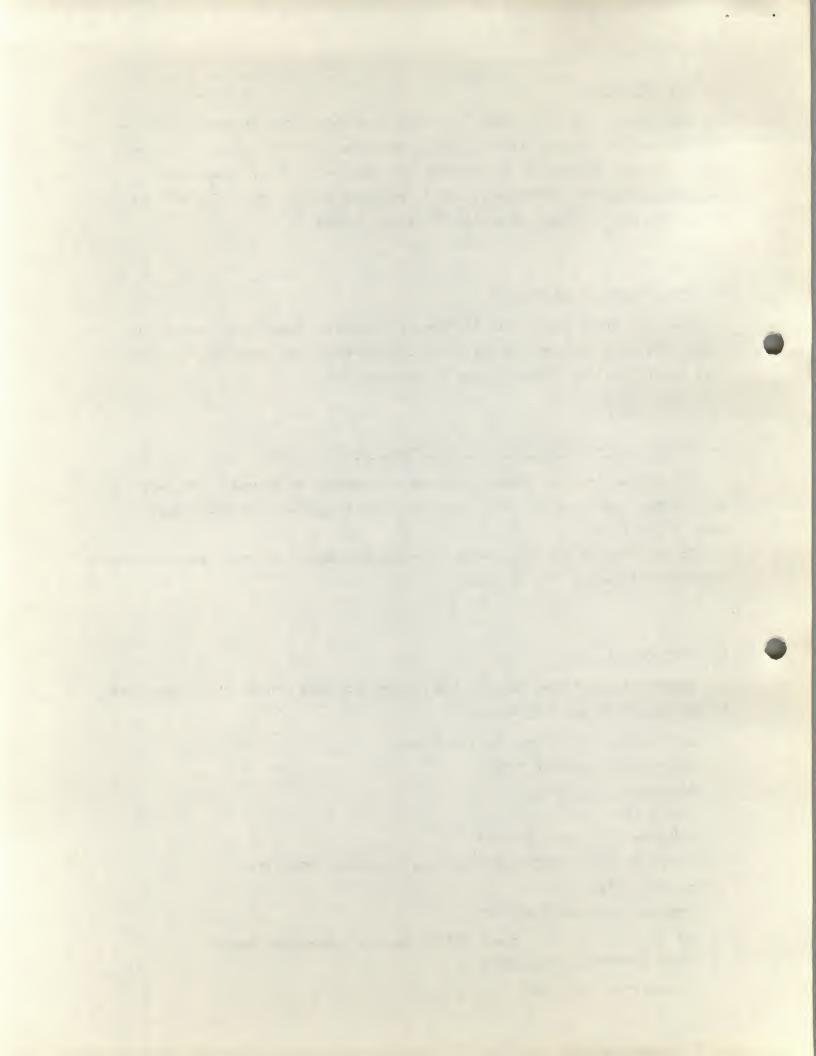
Press CONTINUE

Computer stops with AC=7777

Set Bit 0 of SR to 0; place Editor tape in high-speed reader

Press CONTINUE. Tape reads in

Minimonitor types "#"



## 6. Examples of Use cont'd

Type W (for write)

Computer stops with AC=7777

Set SR to 7000; press CONTINUE

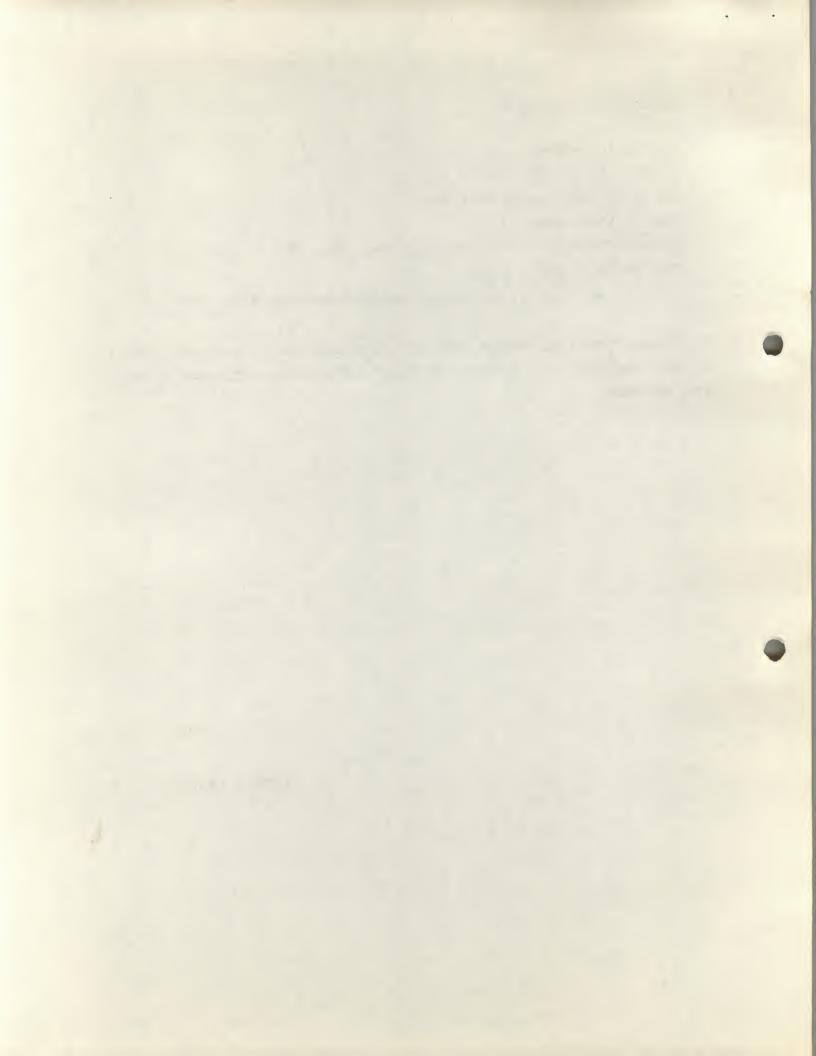
Type 6 (core image 6)

Minimonitor writes on DECtape, and then types "#"

Type RO (read system block)

Computer now contains BIN loader, ready to start at 7777.

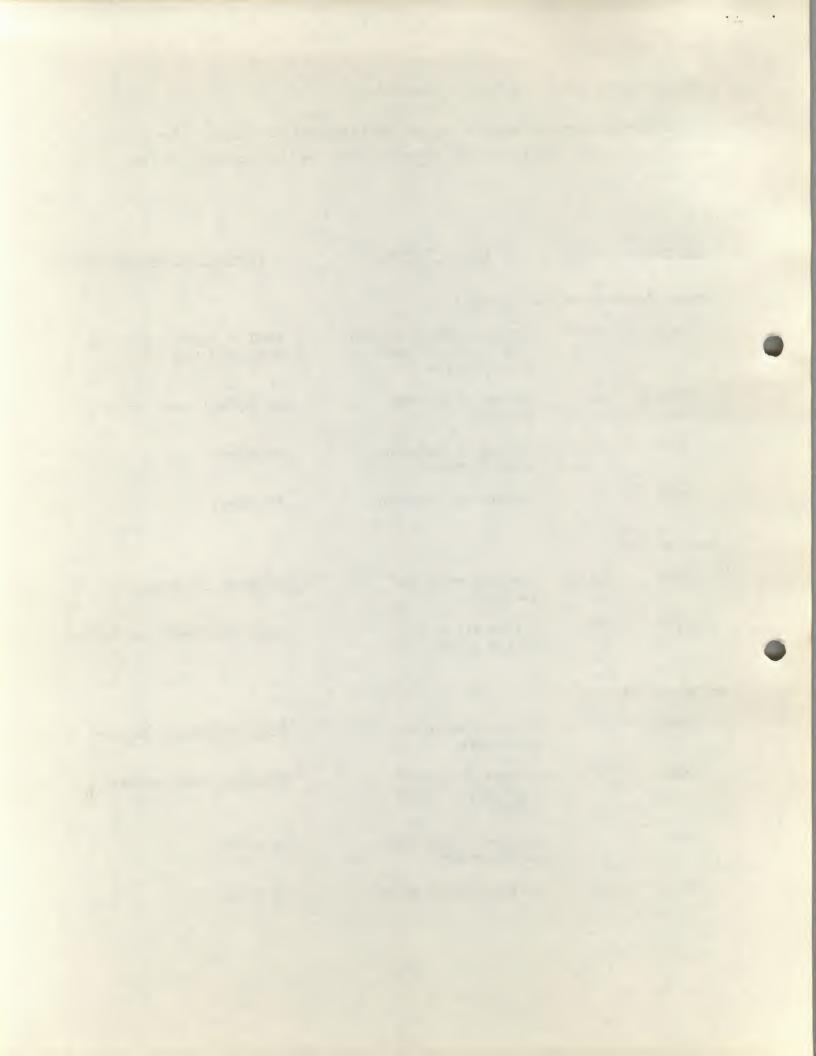
To load core image 6 back into core, just load the minimonitor, start it at 7600, and type R6 in response to the #. Then press HALT; load address 200, and start.



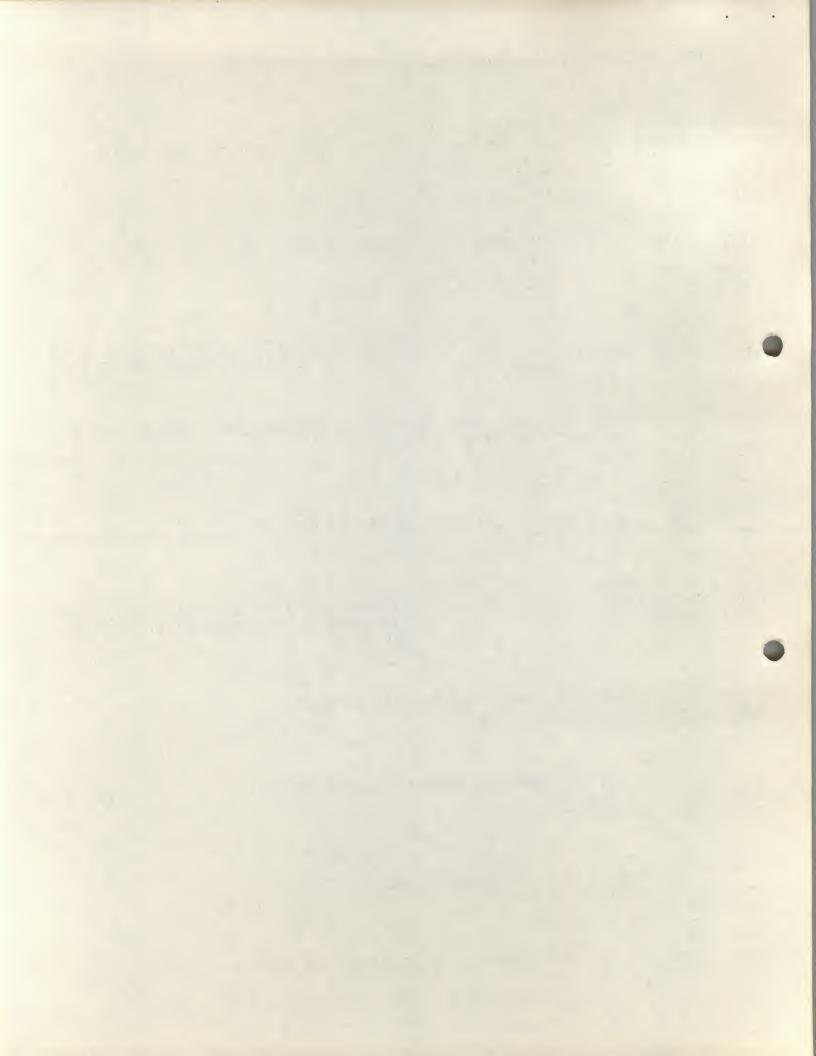
Appendix: Halt Locations for the Minimonitor

The minimonitor may halt in any of the following locations. (For Load and Write routines, addresses are given relative to the beginning of the routine.)

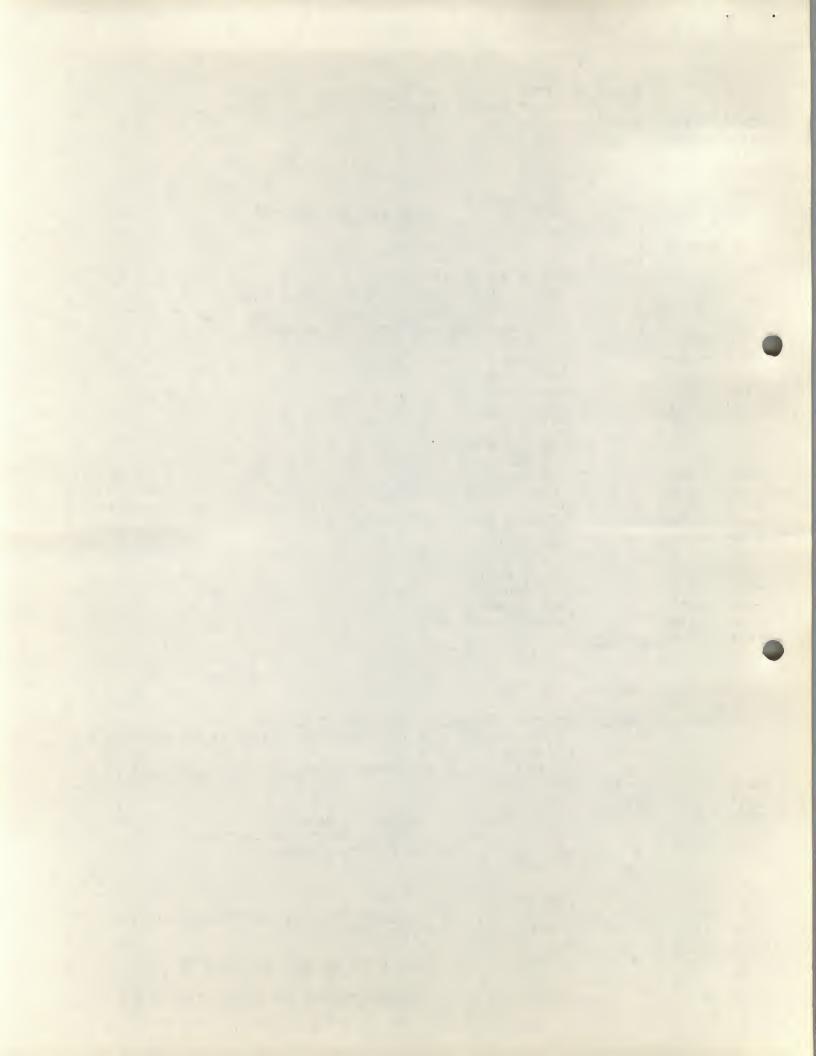
Address	AC	Reason for Halt	Effect of pressing CONTINUE
Command deco	der and n	read routine:	
7614	7777	Set SR to first locn of page to accept Load or Write routine	Load or Write routine is read into that page
7644	0	DECtape unit 0 not selected	Attempts to read again
7704	0	DECtape in end zone going forward	No effect
7734	0	DECtape timing error	No effect
Load routine:			
0003	check- sum	Checksum error on loading	Attempts loading again
0176	7777	Set SR bit 0 to select reader	Loads tape from that reader
Write routine	:		
0004	0	Tried to write on core image 0	Exits to command decoder
0022	0	DECtape unit 0 not selected, or write locked	Attempts to write again
0062	0	DECtape in end zone going forward	No effect
0123	0	DECtape timing error	No effect



```
*7000
              /CODE TO BOOTSTRAP SYSTEM ONTO DECTAPE
  7222
       4114
              XG01.
                      JMS XMOVE /MOVE DIN LOADER TO LOGS 200-377
  7001
        7610
                      7610
  7002
       0210
                      0210
  7003
        0160
                      160
  7004
        4114
                      JMS XMOVE
                                     /MOVE MONITOR TO TOP OF CORE
  7005
       0600
                      600
  7006
       7600
                      7600
 7007
       0200
                      200
 7010
       7200
                                      /EXIT TO 'WRITE' WITH AC=C TO PUT TH
                      CLA
 7211
                      JMP I .+1
       5612
                                    . . / CORE IMAGE ONTO SYSTEM AREA OF TAPE
 7012
       0406
                     MRENT
             /CODE TO MERELY MOVE MONITOR TO TOP OF CORE, WITHOUT WRITING
             /SYSTEM UP ON TAPE
 7013
       4114
             XGO2.
                     JMS XMOVE
 7214
      0500
                     600
 7015
       7600
                     7600
 7016
      3533
                     200
 7017
       5520
                     J'MP I .+1
                                   /EXIT TO MONITOR
 7020
      7600
                     XG03
             *7600
7600
      5601
            XGO3.
                     JMP I .+1
                                     /IF PROGRAM IS STARTED AT 7600, XGO2
7601
      7013
                                     /IS EXECUTED TO BRING MONITOR TO TOP
                     XG02
                                     /OF CORE
            *O
            /MOVE BIN LOADER BACK TO TOP OF CORE
2222
      5100
                   JMP BINMOV
            *10
            /ODDS AND ENDS FOR BOOTSTRAP MONITOR
0010
      2222
            AUTOC. 3
0011 0000
            AUTO1. 3
            *100
            /MOVE BIN LOADER BACK TO TOP OF CORE
0100
     4114
            BINMOV. JMS XMOVE
0101
      0200
                    200
0102
      7500
                    2600
2123
      0200
                    200
2124
      5505
                    JMP I .+1
                                    /EXIT TO BIN LOADER
2125
     7777
                    7777
                                     7
```



```
/MOVE MONITOR TO TOP OF CORE--THIS ROUTINE
             /IS USED BY PUNCHED VERSIONS OF THE MONITOR ALONE
 3136
      4114
             MONMOV, JMS XMOVE
 2127
      0600
                     600
 2112
      7600
                     7600
 2111
      2222
                     200
0112
      5513
                     JMP I .+1
0113
      7600
                     7600
                                     /EXIT TO MONITOR
             /XMOVE
             /SR TO MOVE A PIECE OF CORE.
                                             FOLLOW WITH 3 ARGS:
                     ARG1 = 1ST ADDRESS OF SOURCE AREA
                     ARG2 = 1ST ADDRESS OF DESTINATION AREA
                     ARG3 = NUMBER OF LOCS TO BE MOVED
C114
      0000
                     0
            XMQVE.
2115
      7240
                     CLA CMA
2116
      1514
                     TAD I XMOVE
0117
      3010
                     DCA AUTOS
2122
      2114
                     ISZ XMOVE
2121
      7240
                     CLA CMA
0122
      1514
                     TAD I XMOVE
2123
      3011
                     DCA AUTO1
2124 : 2114
                     ISZ XMOVE
0125
      1514
                     TAD I XMOVE
2126
     7241
                     CIA
0127
      3136
                     DCA XMOVES
0130
      2114
                     ISZ XMOVE
2131
     1410 XMLOOP, TAD I AUTOC
2132
      3411
                     DCA I AUTO1
2133
      2136
                     ISZ XMOVEC
2134 5131
                    JMP XMLOOP
2135 5514
                    JMP I XMOVE
      2000
            XMOVEC, C
2136
            *200
            /MODIFICATIONS TO BIN LOADER, SO THAT IT
                    1. STARTS AT 1ST LOCK OF PAGE, AND HALTS TO ENABLE
                    SR OPTIONS TO BE SET
                    2. EXITS TO 7600 AFTER CHECKING THAT CHECKSUM IS 0
2222
            BIN1.
      5372
                    JMP BIN3
2221
      7450
            BIN2.
                    SNA
0202
      5772
                    JMP I BIN3
                                    /EXIT TO MONITOR
2223
      7402
                    HLT
                                     /CHECKSUM IS NON-ZERO
0204
      5301
                    JMP 301
                                     RESTART LOADER
            *371
2371
      5201
                    JMP BIN2
0372
     7600
            BIN3.
                    7600
                                     /(CLA) REPLACE HLT INSTRN IN LOADER
2373
     1371
                    TAD BIN3-1
                                     /BY JMP BIN2
2374
      3300
                    DCA 300
2375
      7240
                    CLA CMA
                                     /HLT TO ENABLE SETTING OF SR
2376
     7402
                    HLT
2377
     5301
                    JMP 301
                                     /LAST INSTRN OF REAL BIN LOADER
```



```
SDST=6772
       SDSQ=6773
       SDLC=6774
       SDLD=6775
       SDRC=6776
       SDRD=6777
       *400
       /WRITE ROUTINE
 4741
      WRITE1, JMS I IACPT
 1362
                COSMW DAT
 7440
                SZA
 5206
                JMP .+3
 7602
                HLT CLA
                                 /TRIED TO WRITE ON SYSTEM PART
 5745
                JMP I WWCOUNT
                                 /EXIT TO MONITOR
 7002
       WRENT.
                7002
 7110
                CLL RAR
 7000
                NOP
                                 /UNUSED LOCATION
 3343
                DCA "BLOCK
3344
                DCA WOUFF
1361
                TAD 11137
                                 /PGCT = -37
3346
                DCA WPGCT
6774
       WSTART. SDLC
6776
               SDRC
2354
                AND "P100
7650
               SMA CLA
5224
               JMP .+3
7402
       WSELER, HLT
                                 /SELECT ERROR, OR WRITE LOCK
5215
               JMP WSTART
                                 /PRESSING CONT GIVES ANOTHER LIFE
7232
      WGO.
               CLA CML RTR
1351
               TAD "/P1000
6774
               SDLC
4742
               JMS I IRDQUA
4742
               JMS I IRDQUA
6771
      WSRCH.
               SDSS
5231
               JMP .-1
5776
               SDRC
7126
               CLL RTL
0352
               AND WP374
1254
               TAD YM112
7450
               SNA
5256
               JMP WENDZ
1357
               TAD WM20
7640
               SZA CLA
```

SDSS=6771

0400

0401

0402

0403

2424

2425

0406

0407

0410

2411

0412

2413

2414

2415

2416

2417

0420

2421

0422

2423

2424

2425

0426

2427

2432

0431

2432

2433

2434

2435

2436

2437

2442

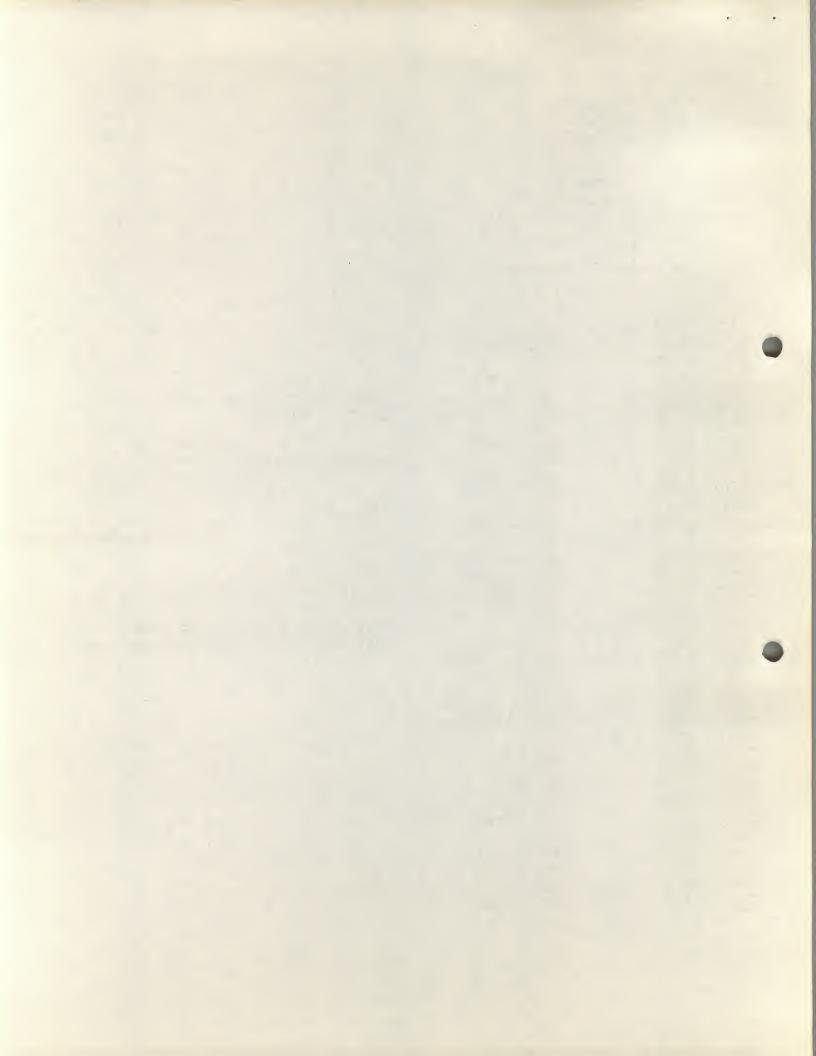
2441

2442

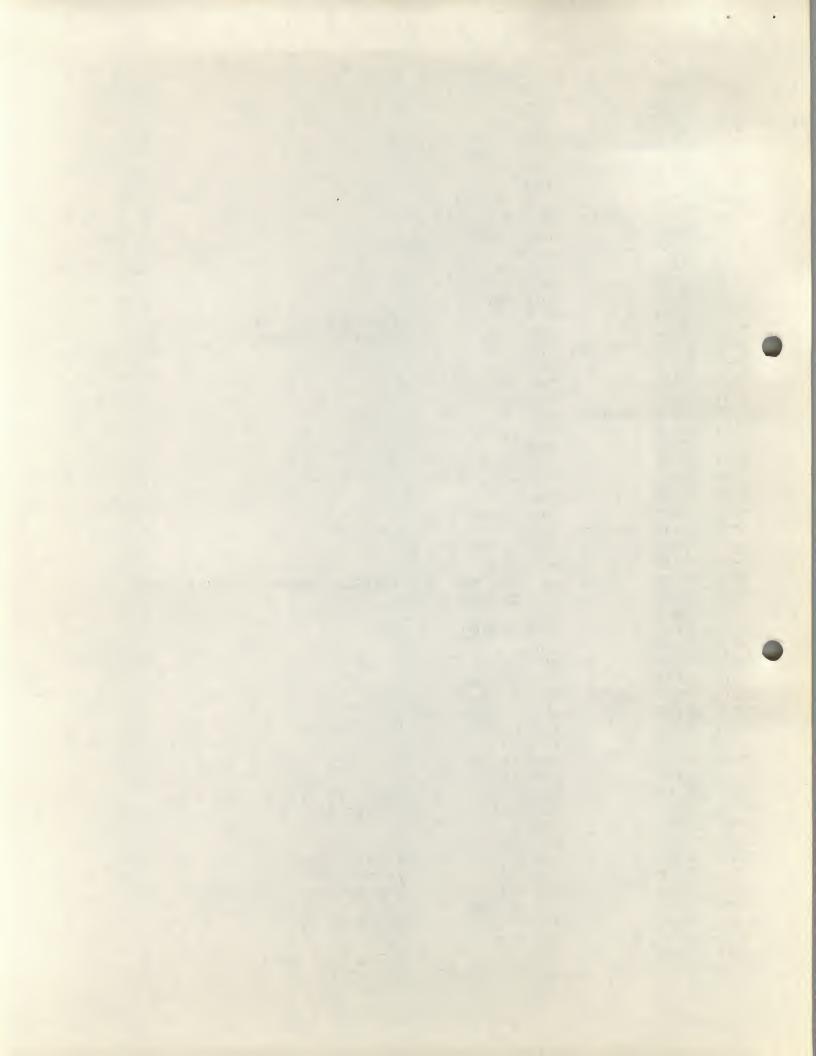
2443

5231

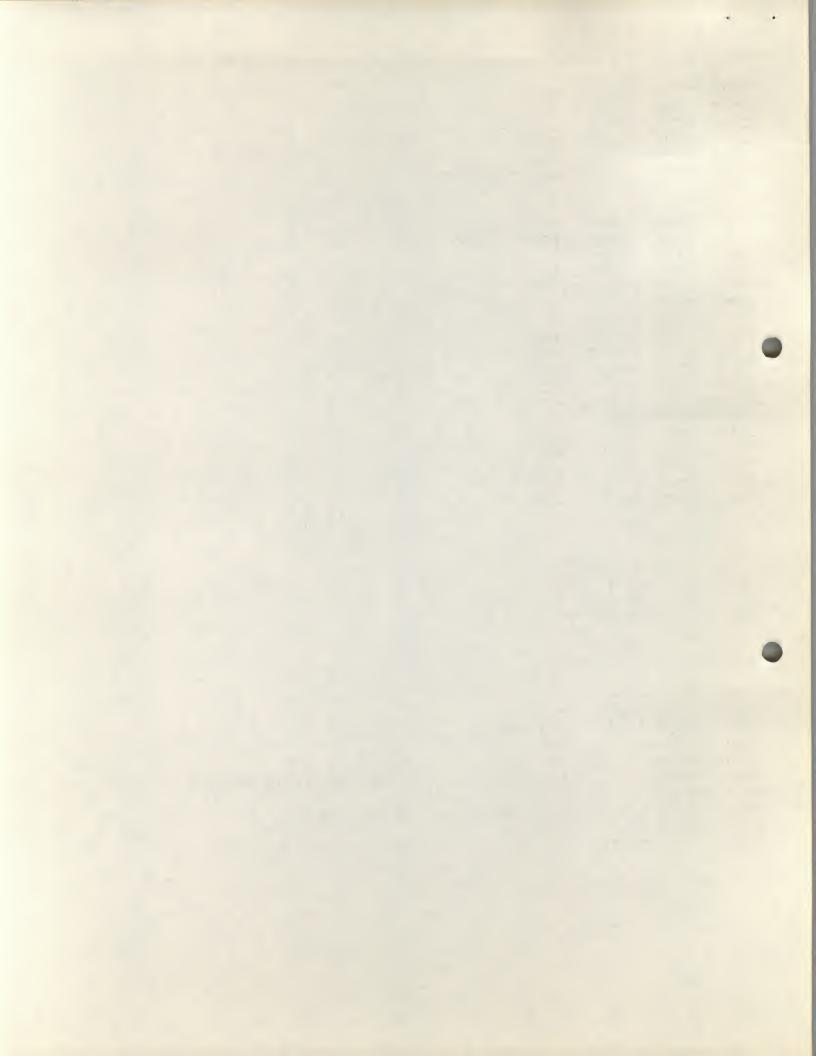
JMP "SRCH



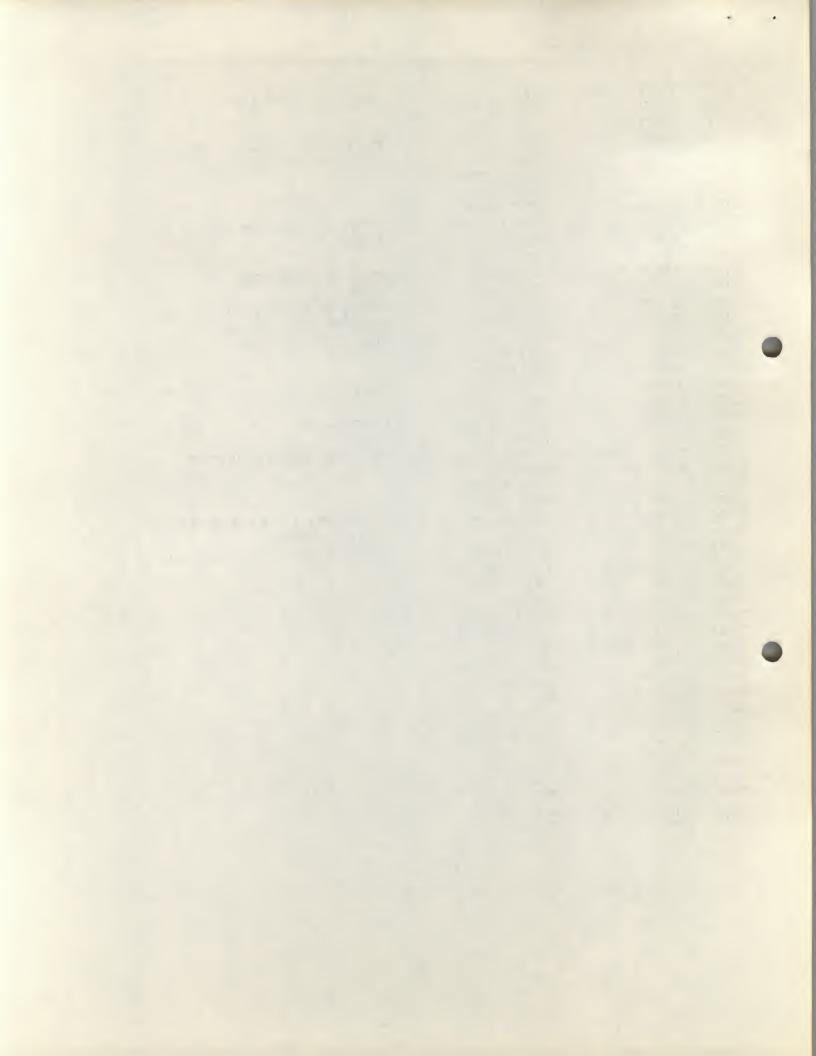
```
2444
       6777
                      SDRD
 2445
       7430
                      SZL
 2446
       1356
                      TAD WP3
 2447
       7040
                      CMA
 0450
       1343
                      TAD "BLOCK
       7243
 2451
                      CMA
 2452
       7450
                      SNA
 2453
       5264
                      JMP WFOUND
 2454
       7670
             W4110.
                      SZL SNA CLA
 2455
       5231
                      JMP WSRCH
 0456
       6776
             WENDZ.
                      SDRC
 2457
       7106
                     CLL RTL
2462
      7630
                     SZL CLA
2461
      5224
                     JMP WGO
2462
      7402
                     HLT
                                      /IN ENDZONE GOING FORWARD
2463
      5262
                     JMP .-1
                                      /A REAL STOPPER
2464
            WFOUND, SZL GLA
      7630
2465
      5224
                     JMP WGO
2466
      1345
                     TAD WWCOUNT
2467
      3347
                     DCA WWORDS
2472
      6771
            WREVGR. SDSS
2471
      5270
                     JMP .-1
2472
      6775
                     SDRC
2473
      2355
                     AND WP77
2474
      1360
                     TAD WM32
0475
      7640
                     SZA CLA
2476
     5270
                     JMP WREVGR
2477 6776
            WRITER, SDRC
0500
      2353
                     AND WP300
2521
      7640
                     SZA CLA
0502
      5222
                     JMP WSELER
                                      /SELECT ERROR OR WRITE LOCK
2523
      4742
                     JMS I IRDQUA
2524
     7200
                     CLA
0505
     1350
                     TAD WP1400
2526
      6774
                     SDLC
2527
     7240
                     CLA CMA
2512
      4333
                     JMS WRQUAD
2511
      1744
            WRLP.
                     TAD I WBUFF
2512
      4333
                     JMS WRQUAD
2513
      2344
                     ISZ WBUFF
2514
      7000
                     NOP
0515
     2347
                     ISZ MWORDS
2516
     5311
                     JMP WRLP
      6773
2517
                     SDSQ
                                      /WAIT FOR LAST DATA WORD
0520
      5317
                     JMP .-1
                                      /TO BE WRITTEN
2521
      6772
                     SDST
2522
      5325
                     JMP .+3
2523
      7402
                    HLT
                                      /TIMING ERROR
2524
                    JMP .-1
     5323
                                      /A REAL STOPPER
2525
      7320
                    CLA CLL CML
                                      /FORCES MOTION FORWARD
2526
      2343
                    ISZ WBLOCK
                                      NEXT BLOCK TO TRANSFER
2527
      2345
                    ISZ WPGCT
                                      /DONE YET ?
2532
      5224
                    JMP WGO
                                      /NO
2531
      5774
                    SDLC
                                      /YES. STOP UNIT
2532
      5745
                    JMP I WWCOUNT
                                      /GET OUT
```



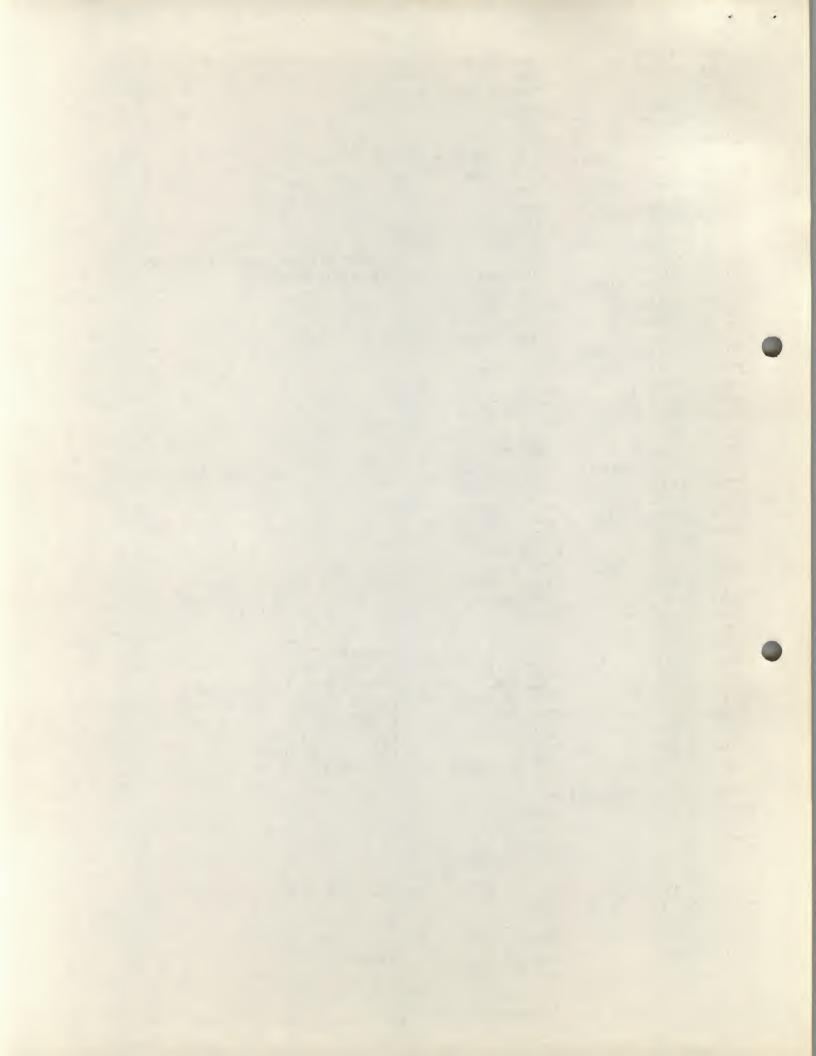
```
2533
        2222
              WRQUAD, 3
 2534
        6773
                      SDSQ
 2535
        5334
                       JMP .-1
 2536
       6775
                       SDLD
 2537
       7200
                       CLA
 2542
       5733
                       JMP I WRQUAD
 2541
       7751
              IACPT.
                      ACPT+7000
 2542
       7744
              IRDQUA, RDQUAD+7000
 2543
       2222
              WBLOCK, C
 2544
       2222
              WBUFF.
 2545
       7600
              WWGOUNT, 7600
 2546
       2000
             WPGCT.
                      0
 2547
       0000
             WWORDS.
 0550
       1400
             WP1400, 1400
             WP1000, 1000
 2551
       1000
 0552
       2374
             WP374.
                      374
 2553
       0300
             WP300.
                      300
 2554
             WP 100.
       0100
                      100
 2555
       0077
             "P77.
                      77
2556
       0003
             WP3.
                      3
2557
       7760
                      -50
             WM20.
2562
      7746
             WM32.
                      -32
2551
       7711
             "M37.
                      -37
0562
       7520
             WM260.
                      -260
             SDSS=6771
             SDST=6772
             SDSQ=6773
             SDLC=6774
             SDLD=6775
             SDRC=6776
             SDRD=6777
             *600
2600
      7300
             BEGIN.
                     CLA CLL
2621
      1370
                     TAD P243
2602
      6044
                     TPC
0603
      4351
                     JMS ACPT
                                       /COUGH
2624
      1376
                     TAD M322
                                       /LOAD, READ, OR WRITE ?
2625
      7450
                     SNA
2606
      5224
                     JMP READ1
                                       /R FOR READ
3637
      7700
                     SMA CLA
2610
      7101
           WRITE.
                    IAC CLL
                                      />R = W, FOR WRITE
```



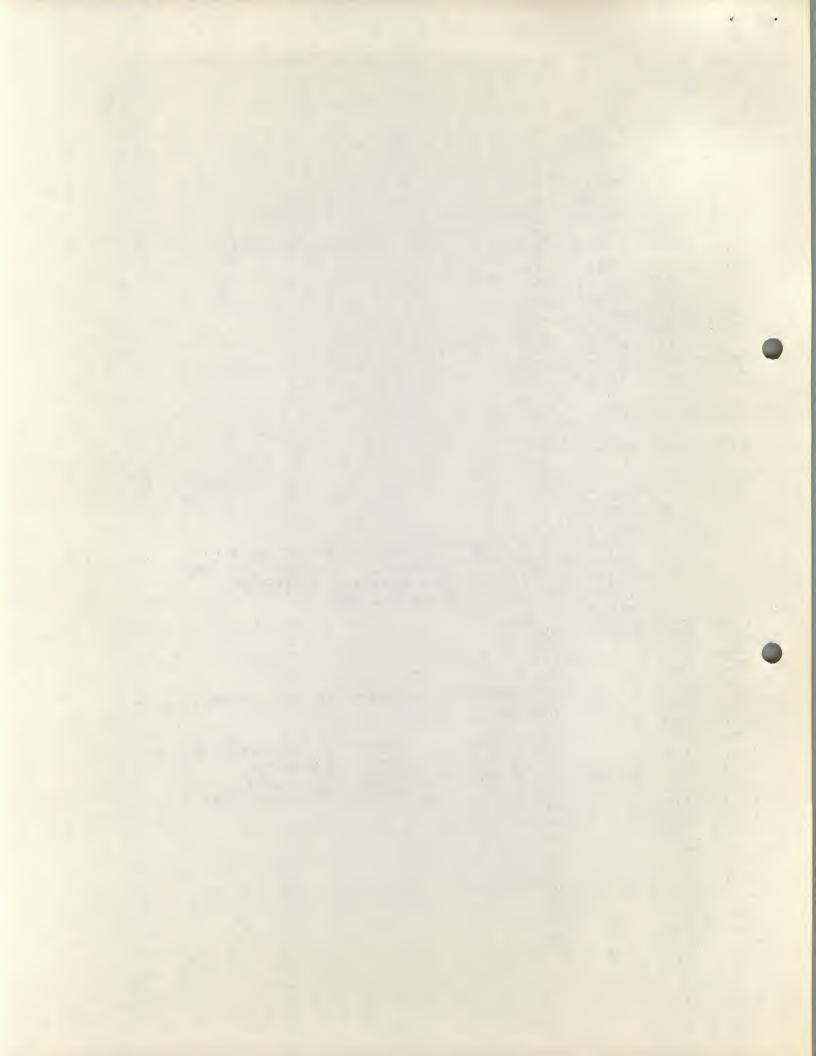
	2611 2612		LOAD.	IAC		/ <r =="" for="" l,="" load<="" th=""></r>
	2613			DCA BLOCK CLA CMA		
	2614	7402		HLT		/WATT WITH AC A SEC
	2615			LAS		/WAIT WITH AC=-1 FOR SR
	2616			AND WCOUNT		/GET SA OF FREE CORE PAGE
	2617			DCA BUFF		
	2622	1361		TAD BUFF		
	2621			DCA LEAVE		/PREPARE SA FOR EXIT
	2622	7040		CMA		/PGCT=-1
	2623	5236	DC 404	JMP START-1	١.	·
	2625	4351	READ1,	JMS ACPT		/GET DUMP NUMBER
	2626	7002		TAD M260		/STRIP IT
	627	7110		7002		/BSW. MULTIPLY IT BY 40
	630	7000		CLL RAR NOP		GET BLOCK NUMBER
	631	3360		DCA BLOCK		/UNUSED LOCATION
	632	3351		DCA BUFF		
	633	1364		TAD WCOUNT		/SET EXIT ADDRESS TO 7600
	634	3357		DCA LEAVE		AGE1 EVII MODUESS 10 APAG
	635	1374		TAD M37		/PGCT=-37
	636	3352		DCA PGCT		
	637	6774	START.	SDLC		/TRY TO SELECT UNIT C
	640	6776		SDRC		Site of the site o
	641 642	2377		AND P100		
	643	7650 5246		SNA CLA		The second secon
	644	7402		JMP GO		/LINK STILL SET FOR DIRN
	545	5237		HLT MR CTART		/SELECT ERROR
	545	7232	GO,	JMP START CLA CML RTR		/'CONTINUE' GIVES ANOTHER LIFE
	547	1356	00,	TAD P1000		
26	550	6774		SDLC		
	551	4344		JMS RDQUAD		
	552	4344		JMS RDQUAD		· · · · · · · · · · · · · · · · · · ·
	553	6771	SRCH.	SDSS		
	554	5253		JMP1		
	555	6776		SDRC		
	556 557	7106		CLL RTL		
	660	0367 1276		AND P374		
	61	7450		TAD M110		
	62	5300		SNA JMP ENDZ		
	63	1372		TAD M20		
	64	7640		SZA CLA		
	65	5253		JMP SRCH		•
		6777		SDRD		
26	<b>67</b>	7430		SZL		



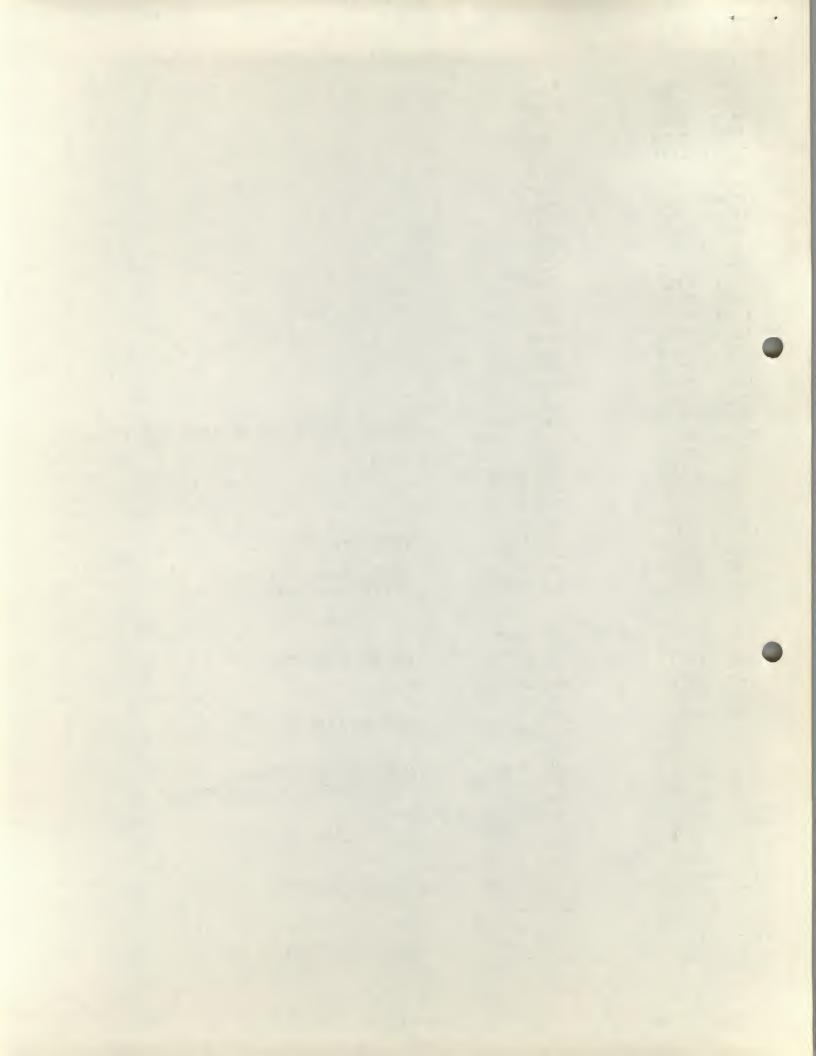
```
2672
        1371
                        TAD P3
  2671
        7040
                        CMA
  2672
        1360
                        TAD BLOCK
  2673
        7040
                        CMA
  2674
        7450
                        SNA
  2675
        5306
                        JMP FOUND
  2676
        7670
               M110.
                        SZL SNA CLA
 2577
        5253
                        JMP SRCH
 2722
        6776
               ENDZ.
                        SDRC
 2721
        7106
                        CLL RTL
 2702
        7630
                        SZL CLA
 2723
        5246
                        JMP GO
 2724
        7402
                       HLT
                                         /IN ENDZONE GOING FORWARD
 2725
        5324
                        JMP .-1
                                         /A REAL STOPPER
 2726
        7532
              FOUND.
                       SZL CLA
 2727
        5246
                       JMP GO
 2712
        1354
                       TAD WCOUNT
 2711
       3363
                       DCA "ORDS
 2712
       6771
              REVGRD, SDSS
 2713
                       JMP .-1
       5312
 2714
       6776
                       SDRC
 2715
       2327
                       AND P77
 2716
       1373
                       TAD M32
 2717
       7640
                       SZA CLA
 2722
       5312
                       JMP REVGRD
 2721
       4344
              READ.
                       JMS RDQUAD
 2722
       4344
                       JMS RDQUAD
 2723
       4344
                       JMS RDQUAD
              RDLP.
 2724
       4344
                       JMS RDQUAD
 2725
       3751
                       DCA I BUFF
 2726
       2351
                       ISZ BUFF
              P77.
 2727
       2277
                       77
 2732
       2363
                       ISZ WORDS
2731
       5324
                       JMP RDLP
2732
       6772
                      SDST
2733
       5336
                      JMP .+3
2734
      7402
                      HLT
                                        /TIMING ERROR
2735
       5334
                      JMP .-1
                                        /A REAL STOPPER
2736
       7120
                      CLL CML
                                        /FORCES MOTION FORWARD
2737
       2360
                      ISZ BLOCK
                                        NEXT BLOCK TO TRANSFER
2742
       2362
                      ISZ PGCT
                                        /DONE YET ?
2741
      5246
                      JMP GO
                                        /NO
3742
      6774
                      SDLC
                                        YES. STOP UNIT
2743
      5757
                      JMP I LEAVE
                                        /GET OUT
2744
      0000
             RDQUAD.
2745
      6773
                      SDSQ
2746
      5345
                      JMP .-1
2747
      6777
                      SDRD
2752
      5744
                      JMP I RDQUAD
2751
      2000
             ACPT.
2752
      6031
                      KSF
2753
      5352
                      JMP .-1
2754
      6036
                      KRB
2755
      6044
                      TPC
                                        /ECHO
2755
      5751
                      JMP I ACPT
```



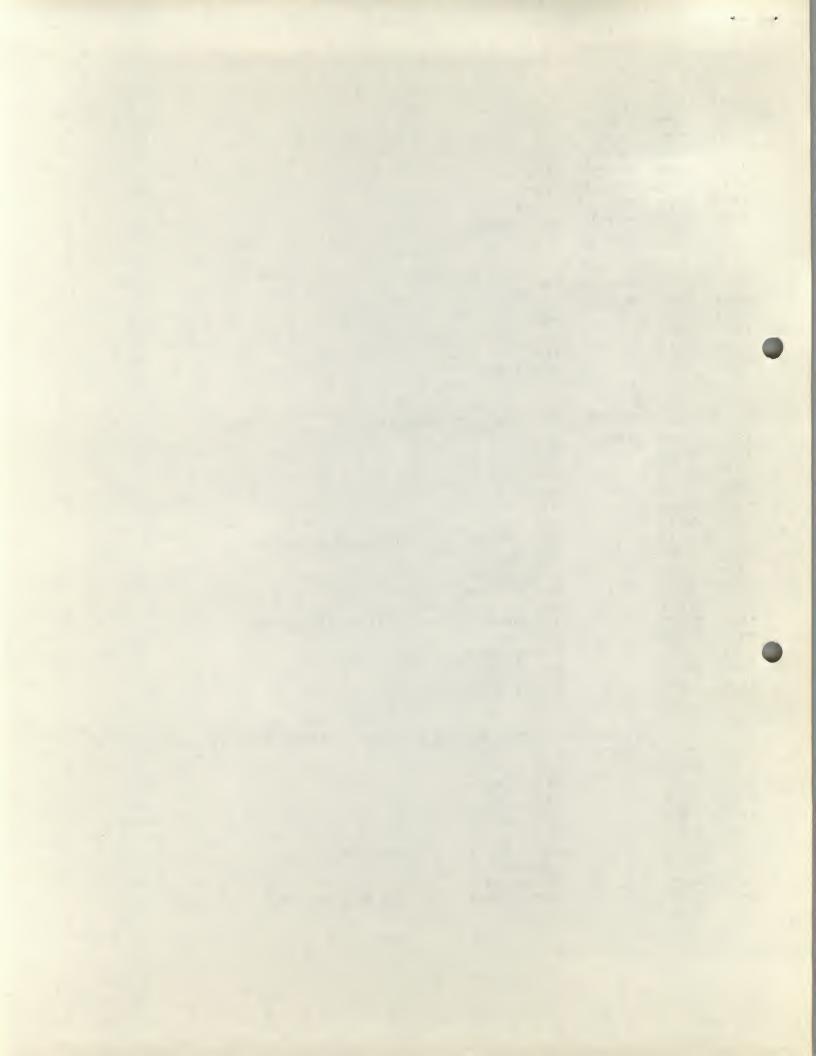
```
2757
         2222
               LEAVE.
  2760
         3000
               BLOCK.
                        0
  2761
         2000
               BUFF.
                        0
  2762
         2000
               PGCT.
                        0
  2763
         2000
               WORDS.
  2764
         7600
               WCOUNT.
                        7600
  2765
         2222
                        0
                                          /UNUSED LOCATION
  2766
               P1000.
        1000
                        1000
  2767
        2374
               P374.
                        374
  2772
        2243
               P243.
                        243
  2771
        0003
               P3.
                        3
  2772
               MSO.
        7760
                        -20
  2773
        7746
               M32.
                        -32
  2774
        7741
               M37.
                        -37
  2775
               MS6C.
        7520
                        -260
 2776
        7456
               M322.
                        -322
               *777
 2777
        2122
              P100,
                        100
              MQL=7421
              MQA=7501
              ACL=7721
              /ROUTINES TO PUNCH THE MONITOR ALONE IN BOTH
              /BIN AND BOOTSTRAP FORMATS.
                                                  ENTER AT *1000
              /WITH SR=C FOR BIN AND SR=1 FOR BOOTSTRAP
              /EXITS TO MONITOR AFTER PUNCHING
              *1000
 1000
       7200
              PNCH.
                       CLA
 1001
       6246
                      TLS
 1002
       7604
                      LAS
 1003
       7450
                      SNA
1004
       5264
                      JMP BINFOR
                                        /PUNCH IN BIN FORMAT IF SR=C
1005
      1250
                      TAD PM1
1006
      7450
                      SNA
1007
      5211
                      JMP BSTRAP
                                        /PUNCH OUT BOOTSTRAP IF SR=1
1010
      5374
                      JMP PPEXIT
                                        /EXIT TO MONITOR
1011
      4361
             BSTRAP.
                      JMS PMANY
                                        /PUNCH OUT O CODE
1012
      4347
                      JMS PLST
                                        /PUNCH FOLLOWING LIST
1013
      2317
                      317
1014
      2272
                      272
1015
      2367
                      367
1016
      2127
                      127
1017
      0107
                      127
1020
      2251
                     261
1021
      2252
                     250
1022
      2317
                     317
1023
      2122
                     102
1024
      2367
                     367
```



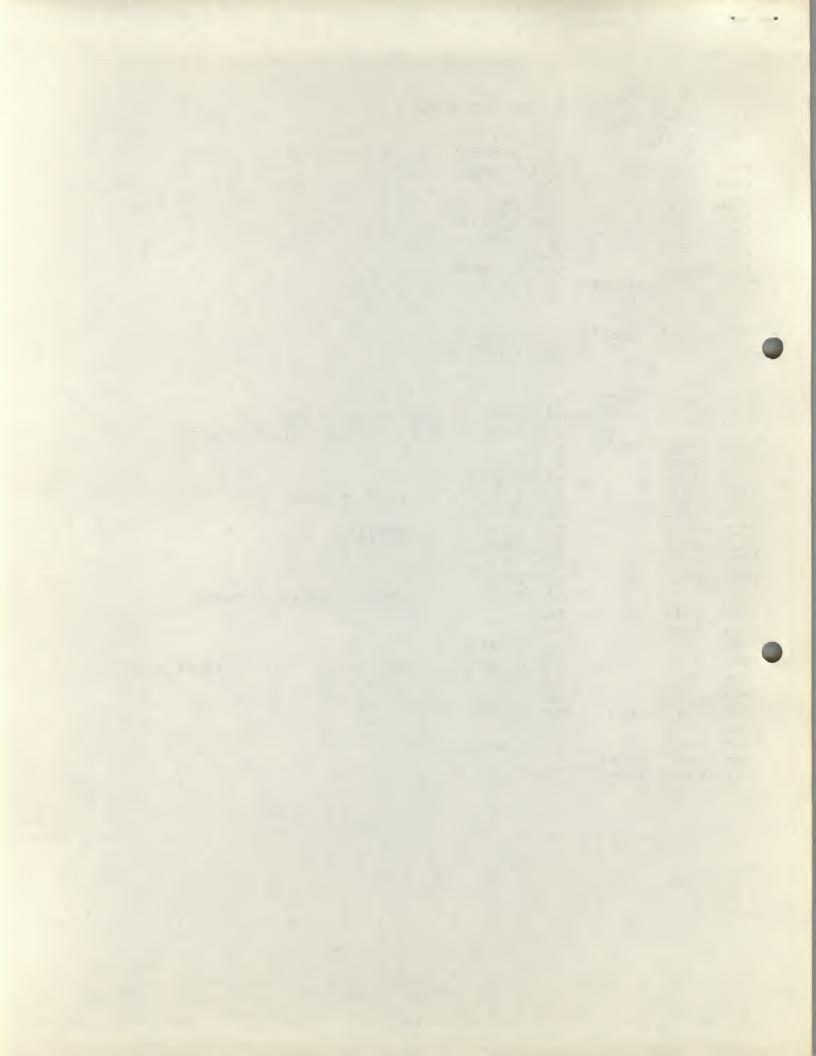
```
1025
         2267
                         267
   1026
         2267
                         267
   1027
         0067
                        .067
   1030
         2251
                        251
   1031
         2317
                        317
  1032
         2172
                        172
  1033
         2367
                        367
         0054
  1034
                        254
  1035
         2231
                        231
  1036
        2275
                        275
  1037
        2126
                        106
  1040
        2266
                        266
  1041
        0102
                        102
  1042
        2234
                        234
  1043
        2027
                        227
  1044
        2274
                       274
  1045
        2002
                       202
  1246
        2275
                       275
  1247
        2277
                       277
 1050
        7777
              PM1.
                       -1
 1051
        1315
                       TAD PP577
                                         /PUNCH CONTENTS OF LOCS 600-777
 1052
        3010
                       DCA AUTOC
 1053
       7100
                       CLL
 1254
       1410
                       TAD I AUTOC
 1055
       4327
                       JMS BINP
 1056
       1010
                       TAD AUTOS
 1057
       2316
                       AND PP777
 1060
       7643
                       SZA CLA
                                        /DONE YET ?
 1061
       5253
                      JMP .-6
 1262
       4361
                      JMS PMANY
                                        /YES. PUNCH C CODE.
 1063
       5374
                      JMP PPEXIT
                                        /EXIT TO MONITOR
 1064
       3321
             BINFOR, DCA CHKSUM
 1265
       1302
                      TAD PP200
                                        /PUNCH 200 CODE
 1065
       4351
                      JMS PMANY
1067
       1317
                      TAD PP7600
1070
       7120
                      STL
1271
       4327
                      JMS BINP
                                       /PUNCH '*7600'
1272
       1320
                      TAD PPINS
1073
      7100
                      CLL
1074
     4327
                      JMS BINP
                                       /PUNCH 'JMP MONMOV'
4275
      4712
                      JMS I ISPUN
                                       /PUNCH CODE TO MOVE MONITOR
1076
      0106
                      MONMOV
1277
      2231
                      XMOVEC-MONMOV+1
1100
      4712
                      JMS I IBPUN
                                       /PUNCH LOCS 600-777
1101
      3500
                     600
1102
      0200
             PP200.
                     200
1103
      1321
                     TAD CHKSUM
                                       /PUNCH CHECKSUM
1104
      7100
                     CLL
1105
      4327
                     JMS BINP
1106
      1302
                     TAD PP200
1107
      4351
                     JMS PMANY
                                       /PUNCH 200 CODE
1110
      5374
                     JMP PPEXIT
                                       /EXIT TO MONITOR
```



```
1111
       1225
              ICRLF,
                       CRLF
 1112
       1200
              IBPUN.
                       BPIIN
 1113
       2277
              PP77.
                       77
 1114
       2177
              PP 177.
                       177
 1115
       2577
              PP577.
                       577
 1116
       2777
              PP777.
                       777
 1117
       7600
              PP7600.
                      7600
 1120
       5106
              PPINS.
                      JMP MONMOV
 1121
       2222
              CHKSUM, 2
             /PUNCH OUT AC
1122
       2000
             PUN.
                      2
1123
      6041
                      TSF
1124
      5323
                      JMP .-1
1125
      6046
                      TLS
1126
      5722
                      JMP I PUN
             /PUNCH OUT AC & L IN BINARY
1127
       2000
                      0
             BINP.
1130
       7421
                      MQL
1131
      7501
                      MQA
1132
       7012
                      RTR
1133
      7012
                      RTR
1134
      7012
                      RTR
1135
      2314
                      AND PP177
                                        /MAY BE ADDRESS
1136
      4322
                      JMS PUN
1137
      1321
                      TAD CHKSUM
1140
      3321
                      DCA CHKSUM
1141
      7701
                      ACL
1142
      2313
                      AND PP77
                                      /CAN'T BE ADDRESS
1143
      4322
                      JMS PUN
1144
      1321
                      TAD CHKSUM
1145
      3321
                      DCA CHKSUM
1146
      5727
                      JMP I BINP
             /PUNCH OUT LIST FOLLOWING JMS, TERMINATED WITH -1
1147
      0000
             PLST.
                     0
1150
      7200
                     CLA
1151
      1747
                     TAD I PLST
1152
      7001
                     IAC
1153
      2347
                     ISZ PLST
1154
      7450
                     SNA
1155
      5747
                     JMP I PLST
                                      /RETURN
1156
      1250
                     TAD PM1
1157
      4322
                     JMS PUN
1160
      5350
                     JMP PLST+1
                                       /GO GET ANOTHER
```



```
/PUNCH OUT AC 200 TIMES
 1161 2222
           PMANY.
                    0
 1162 7421
                    MQL
 1163
     1317
                    TAD PP7600
1164
      3373
                    DCA PMANY1
1165
     7701
                    ACL
1156
      4322
                    JMS PUN
1167
     2373
                    ISZ PMANY1
1170
      5366
                    JMP .-2
      7200
1171
                    CLA
1172
     5761
                 - JMP I PMANY
1173
      0000
            PMANY1, 3
1174
            PPEXIT, JMS I ICRLF
      4711
1175
     5717
                   JMP I PP7600
            *1200
            /PUNCH OUT BLOCK OF CORE IN BIN FORMAT
            /CALL BY 'JMS BPUN; START ADDRESS; NO. OF LOCKS'
1200
     0000
           BPUN.
1201
      7242
                   CLA CMA
1222
     1600
                   TAD I BPUN
1203
     3010
                   DCA AUTOS
                                   /CORE POINTER
     2200
1234
                   ISZ BPUN
1235 1633
                   TAD I BPUN
                                   /COUNT
1206 2200
                   ISZ BPUN
1227
     7041
                   CIA
1210 3223
                   DCA BPUN1
1211 1010
                   COTUA DAT
                                  /PUNCH INITIAL ADDRESS
1212 7001
                   IAC
1213 7120
                   STL
1214 4624
                   JMS I IBINP
1215 1410
                   TAD I AUTOC
                                 /PUNCH OUT NEXT CONTENTS WORD
1216 7100
                   CLL
1217 4624
                   JMS I IBINP
1220 2223
                   ISZ BPUN1
1221 5215
                   JMP .-4
1222 5600
                   JMP I BPUN
1223 0000 BPUN1.
                   0
1224 1127 IBINP.
                   BIMP
```



```
0000
1225
                    0
1226
      7200
                    CLA
1227
      1241
                    TAD PP215
1230
      4640
                    JMS I CRLF1 '
1231
      7200
                    CLA
1232
      1242
                    TAD PP212
1233
      4642
                    JMS I CRLF1
1234
      7200
                    CLA
1235
     6041
                    TSF
                                   /WAIT FOR FLAG
                    JMP .-1
JMP I CRLF
1236
     5235
1237
      5625
1242
     1122 CRLF1,
                    PUN
1241
     0215 PP215.
                    215
1242
     2212
          PP212,
                    212
            /.
```

